5.0 RESULTS

No historic artifacts were present. The recovered artifacts included 76 sherds of pre-contact pottery, 147 flaked stone artifacts, and two other lithic artifacts. These artifacts constitute Site 7S-C-97. No pre-contact or historic features were discovered. A modern horse burial was documented in Units N120 E170 and N120 E169.

5.1 Horizontal Distributions

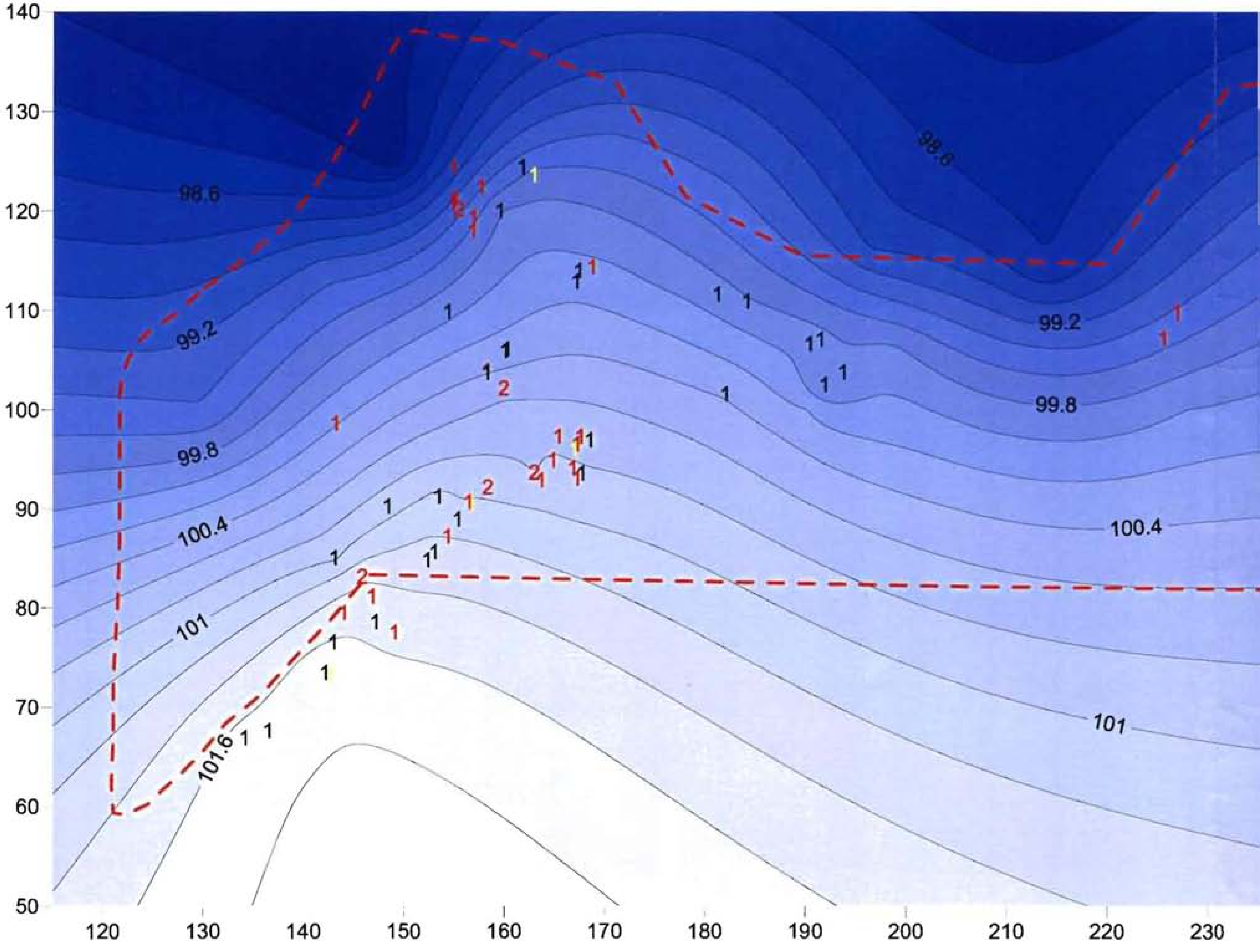
Horizontal artifact distributions were addressed with data from the surface collections and unit excavations (Figures 6-8). The only significant artifact classes were lithic artifacts and pre-contact ceramic sherds. Both artifact classes most commonly occurred in the western end of the APE, especially on the ridge nose, and included two major clusters, designated Locus A and Locus B (Table 1). Low numbers of lithic artifacts and sherds were found farther east, but without any major clustering.

Table 1.
Comparison of Locus and Non-Locus Areas

Attribute	Locus A	Locus B	Non-locus Areas
Area (ha)	0.0254	0.0113	1.0333
Surface lithics	7	2	24
Surface lithics/ha	275.6	177.0	23.2
Surface sherds	15	8	14
Surface sherds/ha	590.6	708.0	13.5
Lithics/1 x 1 m excavated	17.3	5.0	3.3
Sherds/1 x 1 m excavated	14.3	0.0	0.1

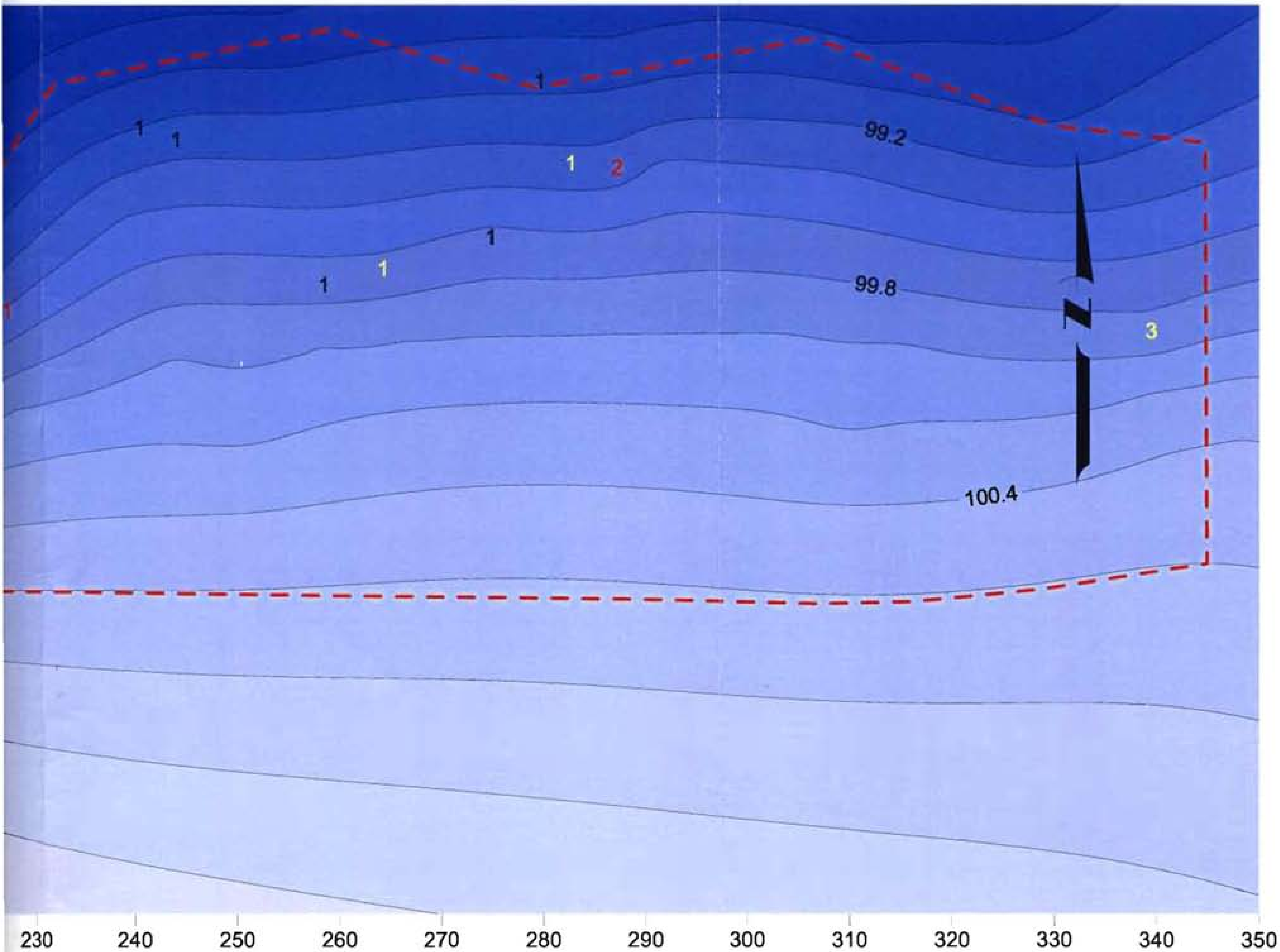
5.1.1 Locus A

Locus A is centered at approximately N95 E162, and measures approximately 18.0 m (59.1 ft) in diameter. The 15 sherds from the surface of Locus A include 11 Mockley-like sherds, two Wolfe Neck-like sherds, and two untyped sherds. Units N90 E160, N100 E160, and N95 E165 fall within Locus A, and yielded 17, 1, and 25 sherds, respectively. The unit-derived sherds in Locus A include 12 Mockley-like, one Coulbourn-like, and 30 untyped sherds. The artifacts from Locus A are consistent with a



Red Numbers - Pre-contact Ceramics
Black Numbers - Flaked Stone Artifacts
Yellow Numbers - Other Lithic Artifacts

Area of Potential Effects



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BRIDGE 918 ON S.R. 30
AT REYNOLDS POND
SUSSEX COUNTY

SURFACE ARTIFACTS

FIGURE - 6

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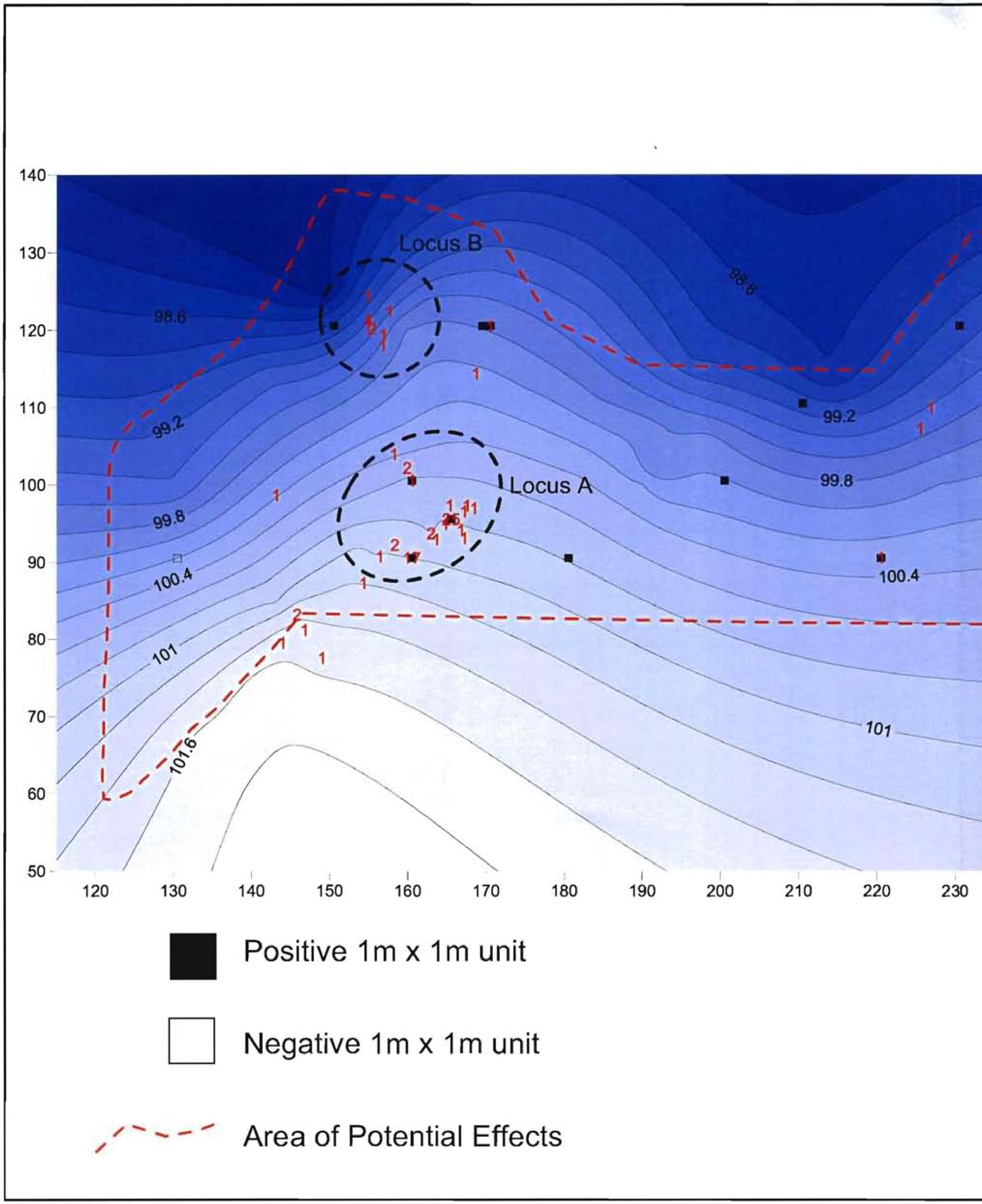
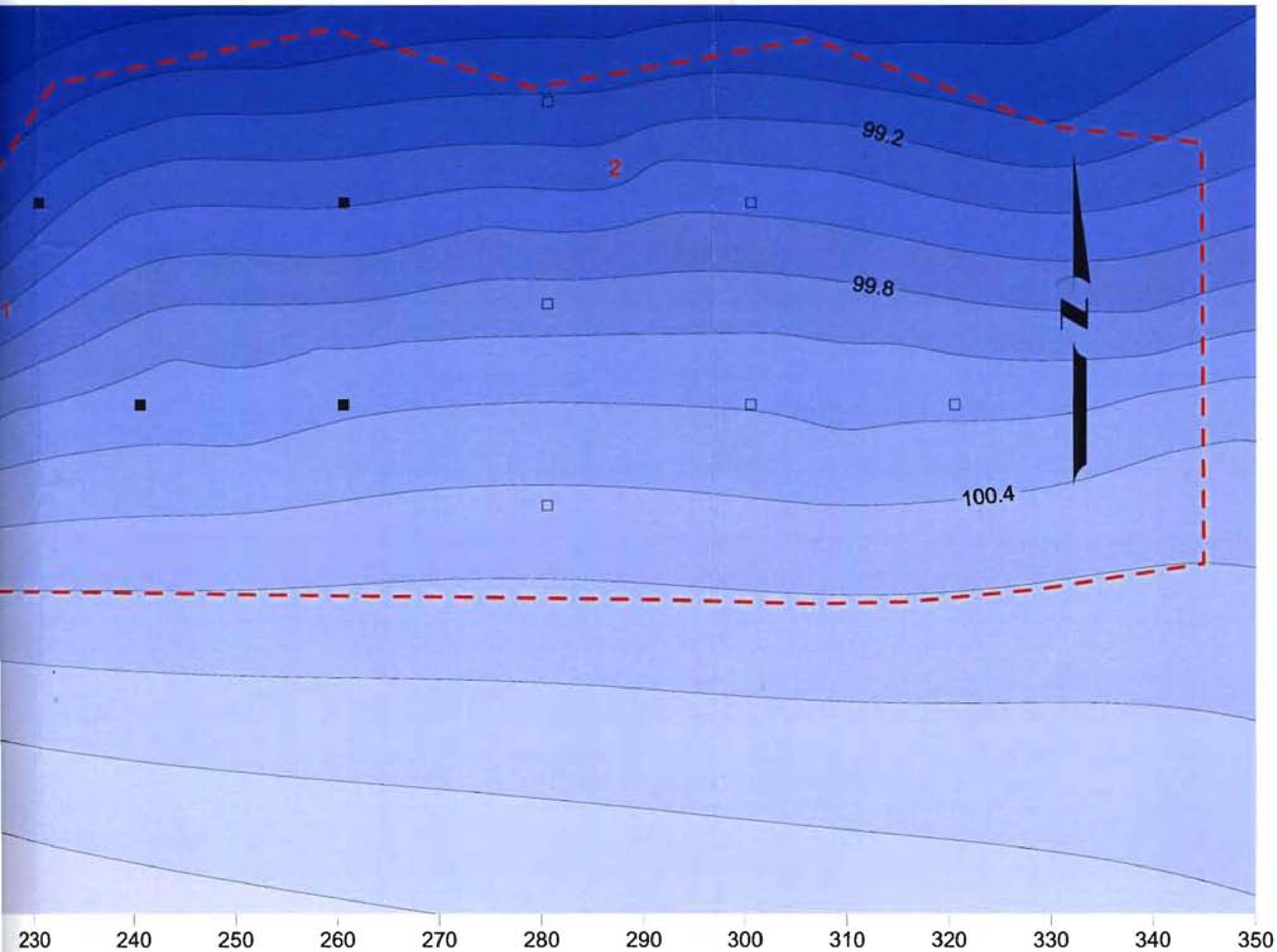
ENGINEERING - PLANNING



Locus B
Locus A
98.6
99.2
99.8
100.4
101
101.6
140
130
120
110
100
90
80
70
60
50
120
130
140
150
160
170
180
190
200
210
220
230
Positive 1m x 1m unit
Negative 1m x 1m unit
Area of Potential Effects



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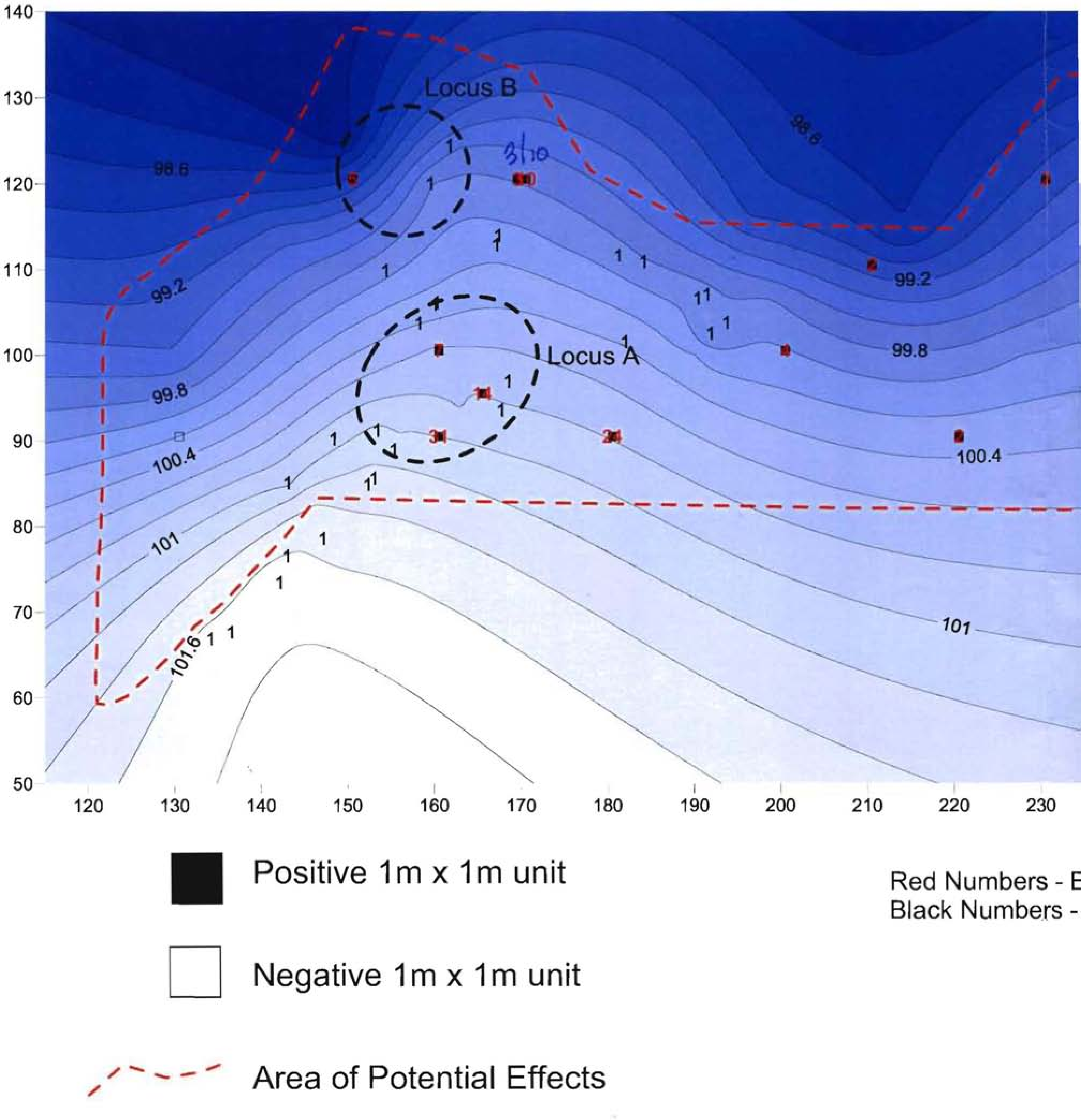
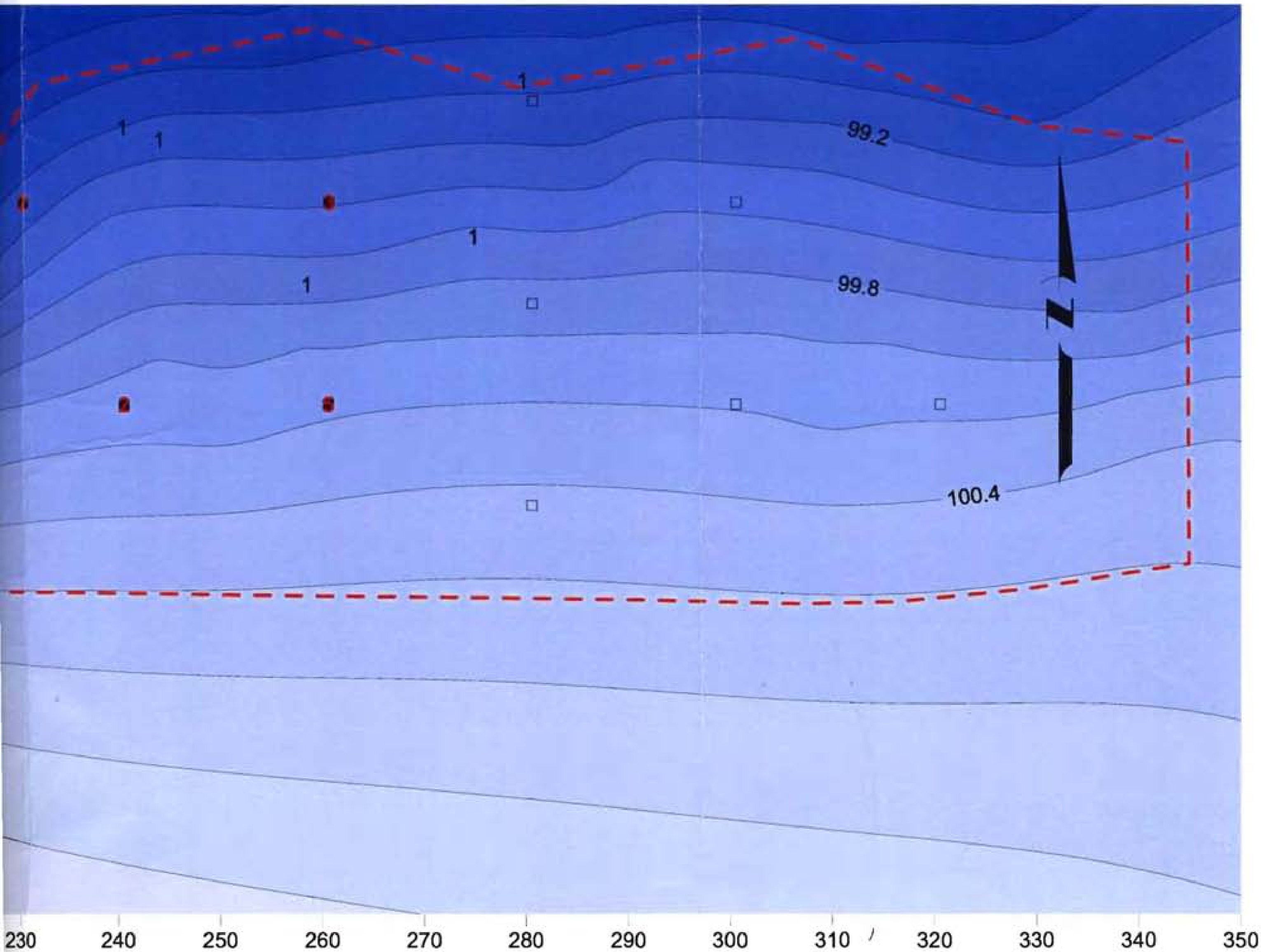
BRIDGE 918 ON S.R. 30 AT REYNOLDS POND SUSSEX COUNTY	
PRE-CONTACT CERAMIC COUNTS, SURFACE AND UNITS	
FIGURE - 7	SKELLY AND LOY, INC. CONSULTANTS IN ENVIRONMENT - ENERGY ENGINEERING - PLANNING



Locus B
3/10
Locus A
98.6
99.2
99.8
100.4
101
101.6
Positive 1m x 1m unit
Negative 1m x 1m unit
Area of Potential Effects
Red Numbers - E
Black Numbers -



rs - Excavated Artifacts
ers - Surface Artifacts

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BRIDGE 918 ON S.R. 30
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SUSSEX COUNTY

FLAKED STONE ARTIFACT
COUNTS, SURFACE AND UNITS

FIGURE - 8

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single component from the Middle Woodland period. The surface sherds in Locus A represent 40.5 percent of all surface sherds from the site, and the unit-derived sherds from Locus A equal 95.6 percent of all unit-derived sherds from the site.

Locus A also yielded a significant portion of all lithics from the site. Seven lithics (21.2 % of all surface-collected lithics from the site) were collected from the surface of Locus A. The three units yielded 52 lithic artifacts, representing 45.6 percent of all unit-derived lithics from the site.

5.1.2 Locus B

The distribution of pre-contact pottery has a strong secondary peak centered at N120 E153. Locus B measures approximately 12.0 m (39.4 ft) in diameter. The eight surface-derived sherds in Locus B include five Mockley-like sherds, two Wolfe Neck-like sherds, and one untyped sherd. These sherds represent 21.6 percent of all surface collected sherds on the site.

Locus B also captured two lithic artifacts from the surface and five lithic artifacts from Unit N120 E150. One of the lithic artifacts from the surface is a projectile point similar to forms from the Mockley component at the Carey Farm site. Overall, the sherds and point are consistent with a Middle Woodland activity area, and may be coeval with Locus A.

5.2 Geomorphology

Generally, the profiles of the APE were of a sandy surface of variable depth, over sediments which included more clay, silt, and/or gravel content. The thickness of the sandy surface ranged from 0 to 94.0 cm (0 to 37.0 in). The surface sands are the aeolian deposition typical for this area, and overlie the fluvial marine sediments. In the soil profile descriptions, the number "2" was placed before the horizon designation to notate a change in parent material from aeolian sands to fluvial marine deposits, if a change occurred.

Within Units N90 E160, N90 E280, N100 E260, and N120 E150, a clear mantle of aeolian sands is present over the fluvial marine sediments. The presence of even a small amount of gravel, or an increase in clay content indicates the change of parent material (James Brewer, personal communication 2005). Within Unit N110 E210, gravels within the surface horizons indicate that very little, if any, overlying aeolian deposits are present over the fluvial marine sediments; therefore, no change in parent material was encountered. Unit N130 E280 was entirely of aeolian sand deposits, but excavation was stopped at 82.0 cm (32.3 in) due to the water table.

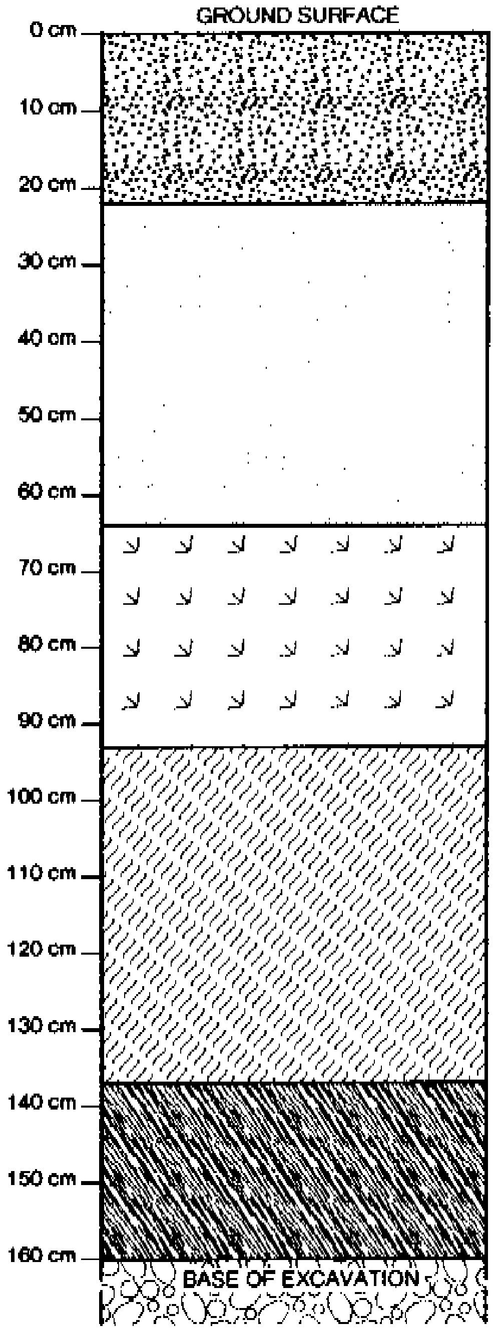
The majority of the aeolian sand deposition took place at the close of the Pleistocene and within the early Holocene, when exposed and unconsolidated sediments were easily dislodged and redeposited by winds. However, additional reworking of these sandy sediments by wind could have caused erosion, redeposition, and dune shifting at any time throughout the Holocene, particularly during periods of minor climate changes and ecological instability (James Brown, personal communication 2005; James Brewer, personal communication 2005). Additional erosion and redeposition may have occurred after deforestation and use of the area for agricultural production. The aeolian sands are coarse-textured, with very little silt or clay content, and are very resistant to weathering. The physical and chemical changes normally associated with soil profile development over time, and which are used to determine the relative age of a soil, occur much more slowly in profiles of predominately sand. Therefore, the age of the aeolian sands is difficult to determine (James Brewer, personal communication 2005). Almost all of the soil horizon development (structure and color changes, clay accumulation) within the APE profiles has occurred within the underlying fluvial marine sediments. The vertical distribution of artifacts suggests that the majority of the aeolian deposition occurred before the Early Woodland.

The vertical distribution of unit artifacts revealed that the vast majority (79.2%) were located in the Ap horizon, and 20.8 percent of the unit artifacts were from 0-20.0 cm (0-7.9 in) in the E horizon or from 0-10.0 cm (0-3.9 in) in the BA horizon. There are no indicators of temporal stratification within the E horizon, and sherds were found in both the Ap and E horizons. The projectile points of temporal significance were all recovered from the surface or from the Ap horizon. The decrease in artifact frequency with depth is consistent with a single cultural stratum that has been impacted by plowing and bioturbation.

5.3 Unit Descriptions

The units are described east to west across the APE. Select unit profile descriptions are presented in Appendix B, and illustrated in Figures 9-14. Artifact catalogs are presented in Appendix C.

SOIL PROFILE
1X1 METER UNIT N90 E160



Ap	10YR 3/2 Very dark grayish brown loamy sand.
E	10YR 5/3 Brown loamy sand.
2Bw	10YR 4/6 Dark yellowish brown sandy loam, slightly higher in clay than E.
2C1	10YR 5/4 Yellowish brown coarse loamy sand, with 10% fine gravels and common 10YR 5/4 Yellowish brown mottles, with Fe stains.
2C2	10YR 5/3 Brown clay loam, grading to saturated sand with depth.
2C3	10YR 7/3 Very pale brown sand.

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SOIL PROFILE
1X1 METER UNIT N90 E160

FIGURE - 9

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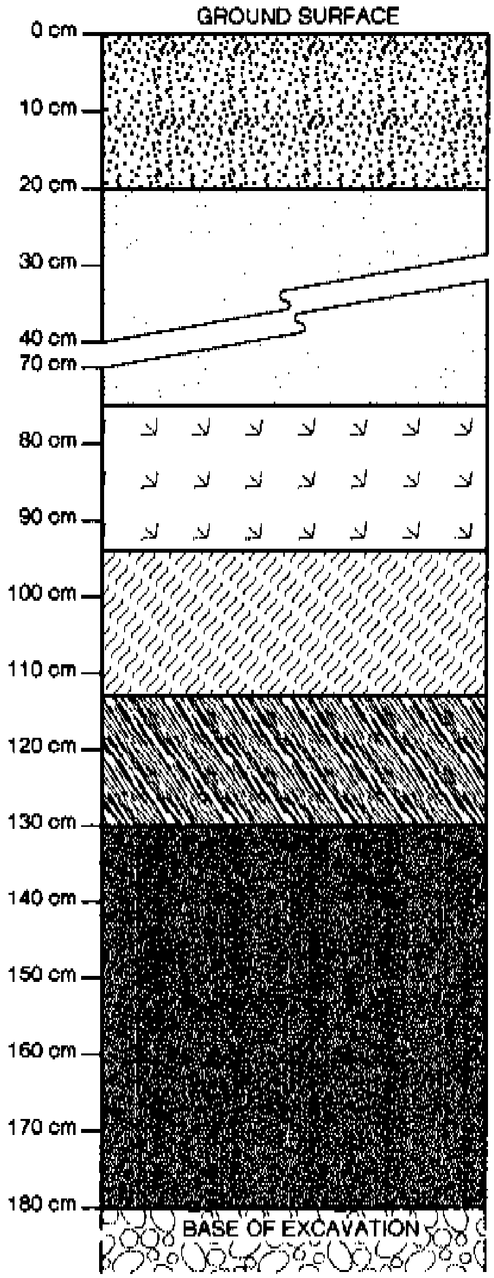
SOIL PROFILE
1X1 METER UNIT N90 E280



Ap	10YR 3/2 Very dark grayish brown loamy sand.
E	10YR 5/3 Brown sand.
Bw1	7.5YR 5/4 Brown loamy sand, with prominent 10YR 4/6 Dark yellowish brown lamellae.
2Bw2	10YR 5/6 Yellowish brown clay loam, with 8% fine gravels and prominent 10YR 4/6 Dark yellowish brown lamellae.
2Bw3	10YR 5/6 Yellowish brown clay loam.
2C1	7.5YR 6/8 Reddish yellow sand.
2C2	7.5YR 6/6 Reddish yellow clay loam.

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SOIL PROFILE
1X1 METER UNIT N90 E280

FIGURE - 10

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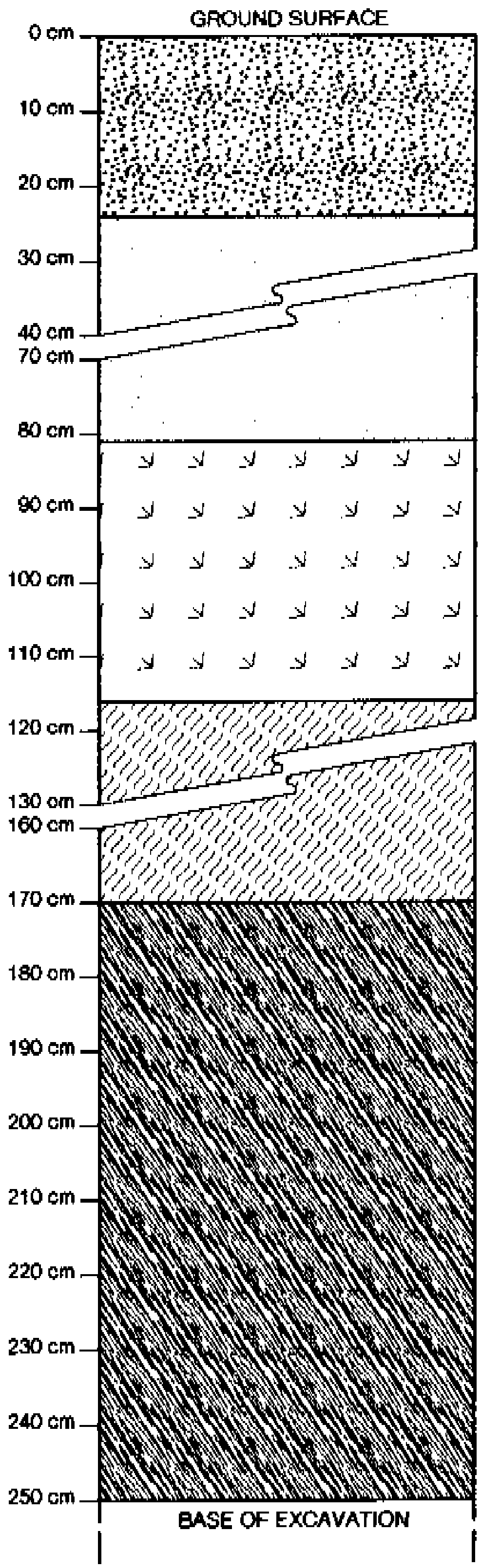
SOIL PROFILE
1X1 METER UNIT N100 E260



Ap	10YR 3/2 Very dark grayish brown loamy sand.
E	10YR 5/3 Brown loamy sand, with few 10YR 4/4 Dark yellowish brown mottles.
2Bw	7.5YR 5/4 Brown loamy sand, with thin lens of fine gravel, clay content increases at base.
2Bt	7.5YR 5/6 Strong brown sandy clay loam.
2C	10YR 6/2 Light brownish gray fine sand.

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SOIL PROFILE
1X1 METER UNIT N100 E260

FIGURE - 11

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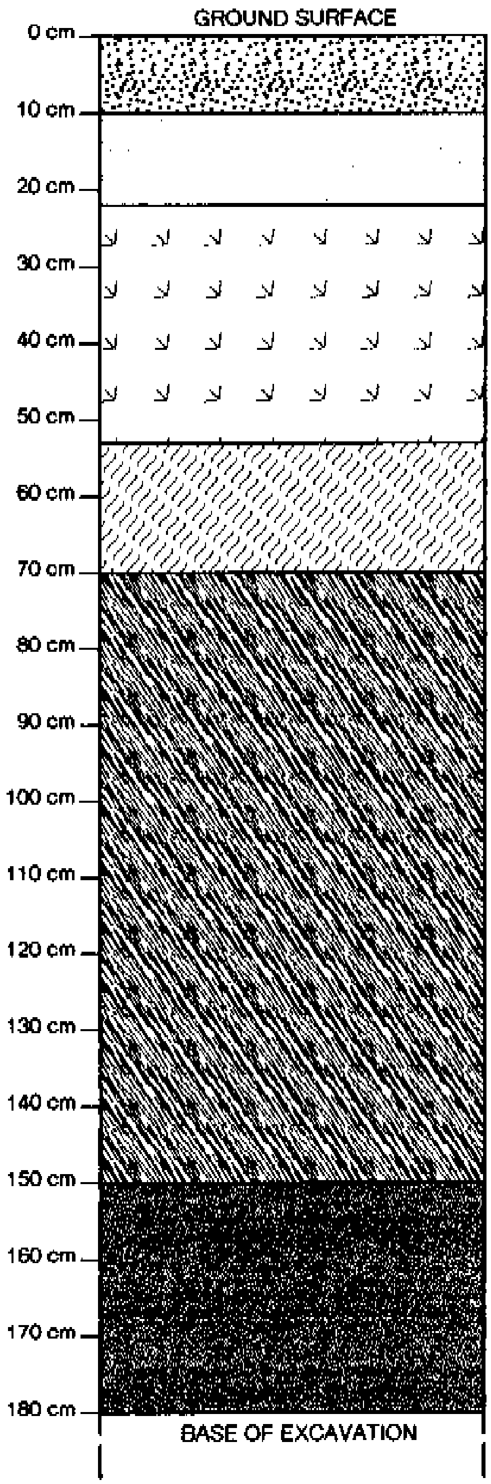
SOIL PROFILE
1X1 METER UNIT N120 E150



Ap	10YR 3/2 Very dark grayish brown loamy sand.
BA	10YR 4/4 Dark yellowish brown loamy sand.
E	10YR 5/3 Brown sand.
Bw	10YR 4/4 Dark yellowish brown loamy sand, with prominent 10YR 4/6 Dark yellowish brown lamellae.
2C1	10YR 5/3 Brown coarse sand, with 10% fine gravels.
2C2	10YR 6/2 Light brownish gray sand.

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SOIL PROFILE
1X1 METER UNIT N120 E150

FIGURE - 12

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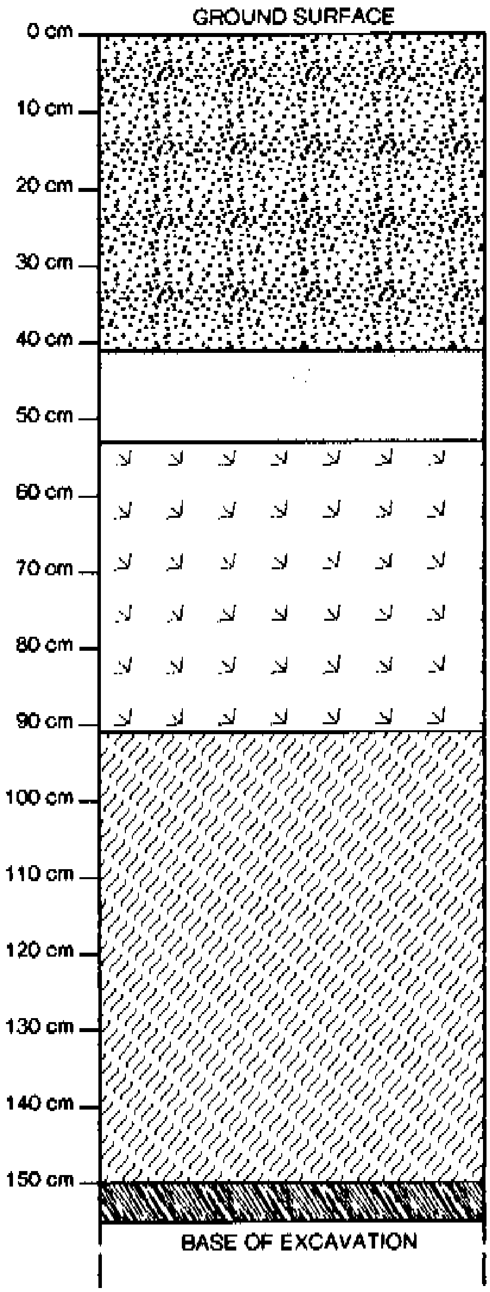
SOIL PROFILE
1X1 METER UNIT N110 E210



Ap	10YR 3/2 Very dark grayish brown sandy loam, with a few fine gravels.
BA	10YR 4/4 Dark yellowish brown loamy sand, with 3% fine gravels and common 10YR 4/4 Dark yellowish brown mottles.
Bt	10YR 4/6 Dark yellowish brown sandy clay loam, with coarse sand and 10% fine gravels and common 10YR 4/4 Dark yellowish brown mottles.
C1	10YR 4/4 Dark yellowish brown sandy clay loam.
C2g	N 5/0 Gray silty clay loam.

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SOIL PROFILE
1X1 METER UNIT N110 E210

FIGURE - 13

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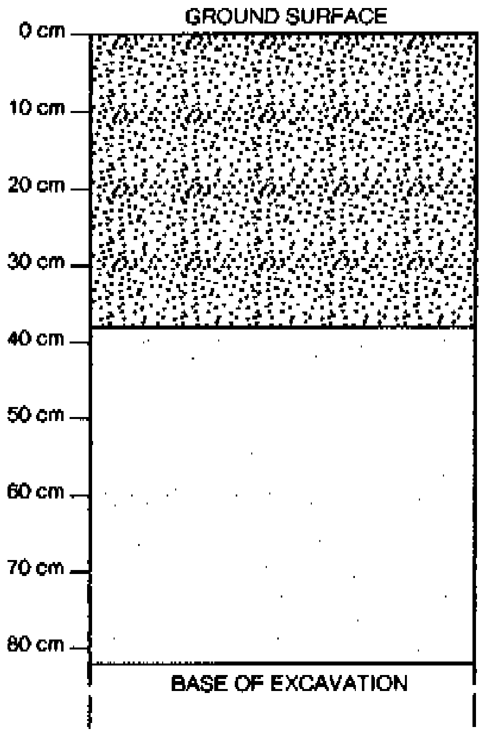
SOIL PROFILE
1X1 METER UNIT N130 E280



Ap 10YR 3/2 Very dark grayish brown loamy sand.

E 10YR 5/3 Brown loamy sand, with common 7.5YR 5/6 Strong brown and 10YR 5/1 Gray mottles.

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SOIL PROFILE
1X1 METER UNIT N130 E280

FIGURE - 14

SKELLY AND LOY, INC.
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5.3.1 Unit N100 E320

Unit N100 E320 was the easternmost unit. A 30.0 cm (11.8 in) thick Ap horizon and the upper 13.0 cm (5.1 in) of the E horizon were excavated. No features and no artifacts were present.

5.3.2 Unit N100 E300

Excavation in Unit N100 E300 captured a 25.0 cm (9.8 in) thick Ap horizon and the uppermost 10.0 cm (3.9 in) of the E horizon. No artifacts and no features were present.

5.3.3 Unit N120 E300

No artifacts or features were discovered in Unit N120 E300. The excavations captured a 31.0 cm (12.2 in) thick Ap horizon and the uppermost 13.0 cm (5.1 in) of the E horizon.

5.3.4 Unit N90 E280

Placed in the barley on the southern end of the APE, Unit N90 E280 was excavated to 150.0 cm (59.1 in) below ground surface (bgs). The profile included six strata: a 20.0 cm (7.9 in) thick Ap horizon; a 55.0 cm (21.7 in) thick E horizon; a 7.0 cm (2.8 in) thick Bw1 horizon; a 7.0 cm (2.8 in) thick 2Bw2 horizon; a 7.0 cm (2.8 in) thick 2Bw3 horizon; and a 2C1 horizon that was more than 20.0 cm (7.9 in) thick. No artifacts and no features were discovered.

5.3.5 Unit N110 E280

No artifacts or features were discovered in Unit N110 E280. The excavations included a 32.0 cm (12.6 in) thick Ap horizon and the upper 12.0 cm (4.7 in) of the E horizon.

5.3.6 Unit N130 E280

Water seepage and wall collapse stopped excavations at 86.0 cm (33.9 in) bgs in Unit N130 E280. The excavations captured a 26.0 cm (10.2 in) thick Ap horizon and the uppermost 60.0 cm (23.6 in) of the E horizon. Neither artifacts nor features were present.

5.3.7 Unit N100 E260

Excavation to 150.0 cm (59.1 in) bgs in Unit N100 E260 documented four soil horizons: a 24.0 cm (9.5 in) thick Ap horizon; a 57.0 cm (22.4 in) thick E horizon; a 35.0 cm (13.8 in) thick 2Bw horizon; and a 2Bt horizon at least 34.0 cm (13.4 in) thick. Artifacts were limited to the Ap horizon and the upper 30.0 cm (11.8 in) of the E horizon (Table 2). No temporally diagnostic artifacts were recovered. No features were present.

Table 2.
Artifact Distribution in Unit N100 E260

Horizon	Depth in Horizon (cm)	Artifacts
Ap	0-24	1 lithic
E	0-10	1 lithic
	10-20	1 lithic
	20-30	2 lithics
	30-40	None
	40-50	None
	50-57	None
2Bw	0-35	None
2Bt	0-34	None

5.3.8 Unit N120 E260

Excavations in Unit N120 E260 captured a 34.0 cm (13.4 in) thick Ap horizon and the uppermost 12.0 cm (4.7 in) of the E horizon. Three lithic artifacts were recovered from the Ap horizon, but none were recovered from the E horizon (Table 3). No features were present.

Table 3.
Artifact Distribution in Unit N120 E260

Horizon	Depth in Horizon (cm)	Artifacts
Ap	0-34	3 lithics
E	0-12	None

5.3.9 Unit N100 E240

A 24.0 cm (9.5 in) thick Ap horizon and the upper 20.0 cm (7.9 in) of the E horizon were excavated in Unit N100 E240. The Ap horizon yielded no artifacts, but two lithic artifacts were recovered from 0-10.0 cm (0-3.9 in) in the E horizon (Table 4). No artifacts were recovered from 10.0-20.0 cm (3.9-7.9 in) in the E horizon. No features were present.

Table 4.
Artifact Distribution in Unit N100 E240

Horizon	Depth in Horizon (cm)	Artifacts
Ap	0-24	None
E	0-10	2 lithics
	10-20	None

5.3.10 Unit N120 E230

Excavations in N120 E230 captured a 61.0 cm (24.0 in) thick Ap horizon and the upper 23.0 cm (9.1 in) of the E horizon. One lithic artifact was recovered from the Ap horizon and one lithic artifact was recovered from 0-10.0 cm (0-3.9 in) in the E horizon (Table 5). No features were present.

Table 5.
Artifact Distribution in Unit N120 E230

Horizon	Depth in Horizon (cm)	Artifacts
Ap	0-61	1 lithic
E	0-10	1 lithic
	10-20	None
	20-23	None

5.3.11 Unit N90 E220

Excavations in Unit N90 E220 included the 20.0 cm (7.9 in) thick Ap horizon and the upper 10.0 cm (3.9 in) of the E horizon. Two lithic artifacts and an untyped pottery sherd were recovered from the AP horizon. The E horizon did not yield any artifacts. No features were present.

5.3.12 Unit N110 E210

This unit was placed in a low draw, which possibly represents the former location of a spring. The excavation captured a 41.0 cm (16.1 in) thick Ap horizon, a 12.0 cm (4.7 in) thick BA horizon, a 38.0 cm (15.0 in) thick Bt horizon, and a 59.0 cm (23.2 in) thick C1 horizon. Two lithic artifacts were recovered from the Ap horizon. There was no cultural material in any of the other horizons. No features were present.

5.3.13 Unit N100 E200

This unit was located near the surface find (N103.77 E193.68) of a straight-stemmed projectile point similar to those recovered from the Wolfe Neck midden. Excavation in Unit N100 E200 captured a 27.0 cm (10.6 in) thick Ap horizon and the upper 22.0 cm (8.7 in) of the E horizon. Three lithics artifacts were recovered from the Ap horizon and one lithic artifact was recovered from 0-10.0 cm (0-3.9 in) in the E horizon. No artifacts were recovered from 10.0-20.0 cm (3.9-7.9 in) and 20.0-22.0 cm (7.9-8.7 in) in the E horizon. Unit N100 E200 contained no features.

5.3.14 Unit N90 E180

This unit was placed approximately 10.0 m (32.8 ft) east of a surface scatter of lithics and sherds. Excavation included the Ap horizon and 22.0 cm (8.7 in) of the E horizon. The Ap horizon yielded 22 lithic artifacts, and two additional lithic artifacts were recovered from 0-10.0 cm (0-3.9 in) in the E horizon (Table 6). No artifacts were recovered from 10.0-20.0 cm (3.9-7.9 in) and 20.0-22.0 cm (7.9-8.7 in) into the E horizon. No temporally diagnostic artifacts were recovered.

Table 6.
Artifact Distribution in Unit N90 E180

Horizon	Depth in Horizon (cm)	Artifacts
Ap	0-25	22 lithics
E	0-10	2 lithics
	10-20	None
	20-22	None

5.3.15 Units N120 E170 and N120 E169

The two contiguous units were placed on the low point of the ridge nose in the northwestern portion of the APE. When Unit N120 E170 discovered a feature with large mammal bone at its base, Unit N120 E169 was excavated to uncover more of the feature and the faunal remains. Although small corners of these units had intact, natural profiles, the majority of both units contained a large, modern feature. The Ap horizon yielded 11 lithic artifacts and one sherd (Table 7). One lithic artifact was recovered from 0-10.0 cm (0-3.9 in) into the feature, and one lithic was recovered from 20.0-30.0 cm (7.9-11.8 in) into the feature (Table 7).

Table 7.
Artifact Distribution in Units N120 E170 and N120 E169

Horizon	Depth in Horizon (cm)	Artifacts
Ap	0-33	11 lithics, 1 sherd
Feature	0-10	1 lithic
	10-20	None
	20-30	1 lithic
	30-40	None
	40-50	None
	50-60	None
	60-70	None
	70-80	None
	80-84	Horse bones

The modern feature measured approximately 1.9 x 0.8 m (6.2 x 2.6 ft). The articulated bones of a small, young horse or pony were recovered at approximately 100.0 cm (39.4 in) bgs. The profile showed that wall collapse had occurred while the feature was open. The well-defined mottles and sharp feature outline are consistent with a modern excavation. No modern or historic artifacts (other than horse bones) were recovered. Interviews with the current owner of the APE (Harry Isaacs, Jr., personal communication 2005) indicated that the APE had formerly been used as pasture, and that the Isaacs would use a backhoe to quickly bury horses and cattle that died of disease.

5.3.16 Unit N95 E165

This unit was within the main surface scatter of sherds and lithic artifacts. The unit captured a 31.0 cm (12.2 in) thick Ap horizon and the upper 23.0 cm (9.1 in) of the E horizon. The 39 artifacts were limited to the Ap horizon and the upper 10.0 cm (3.9 in) of the E horizon (Table 8). Four of the sherds are identifiable as Mockley-like; the others cannot be typed.

Table 8.
Artifact Distribution in Unit N95 E165

Horizon	Depth in Horizon (cm)	Artifacts
Ap	0-31	23 ceramics, 12 lithics
E	0-10 10-23	2 ceramics, 2 lithics None

5.3.17 Unit N90 E160

Unit N90 E160 was placed in a surface scatter of lithics and ceramics. Excavation proceeded to 150.0 cm (59.1 in) bgs. The soil profile included five strata: a 22.0 cm (8.7 in) thick Ap horizon; a 42.0 cm (16.5 in) thick E horizon; a 29.0 cm (11.4 in) thick 2Bw horizon; a 44.0 cm thick (17.3 in) 2C1 horizon; and a 2C2 horizon at least 13.0 cm (5.1 in) thick. Artifacts were recovered from the Ap and E horizons (Table 9). The pottery included eight Mockley-like sherds and one Coulbourn-like sherd. A side-notched jasper projectile point -- vaguely reminiscent of a Brewerton -- was recovered in the Ap horizon.

Table 9.
Artifact Distribution in Unit N90 E160

Horizon	Depth in Horizon (cm)	Artifacts
Ap	0-22	16 ceramics, 14 lithics
E	0-10 10-20 20-30	4 lithics 3 lithics 2 lithics

Horizon	Depth in Horizon (cm)	Artifacts
	30-40 40-42	5 lithics 3 lithics
2Bw	0-29	None
2C1	0-44	None
2C2	0-13	None

5.3.18 Unit N100 E160

Unit N100 E160 was placed on the northern fringe of the major surface scatter of lithic artifacts and sherds. The 23.0 cm (9.1 in) thick AP horizon and the upper 10.0 cm (3.9 in) of the E horizon were excavated. The Ap horizon yielded one sherd (untyped) and seven lithic artifacts. No artifacts were recovered from the E horizon. No features were present.

5.3.19 Unit N120 E150

Unit N120 E150 was excavated in a slight draw, possibly near a former spring. The unit was excavated to 80.0 cm (31.5 in) bgs, at which point water saturation began collapsing the walls. The stratigraphy included: a 10.0 cm (3.9 in) thick Ap horizon; a 12.0 cm (4.7 in) thick BA horizon; a 31.0 cm (12.2 in) thick E horizon; a 17.0 cm (6.7 in) thick Bw horizon; and an 80.0 cm (31.5 in) thick 2C1 horizon. The five lithic artifacts recovered were limited to the Ap horizon, the BA horizon, and the upper 10.0 cm (3.9 in) of the E horizon (Table 10).

Table 10.
Artifact Distribution in Unit N120 E150

Horizon	Depth in Horizon (cm)	Artifacts
Ap	0-10	2 lithics
BA	0-12	2 lithics
E	0-10 10-20 20-30	1 lithic None None
Bw	0-17	None
2C1	0-80	None

5.3.20 Unit N90 E130

Unit N90 E130 was located on the western edge of the APE, on a side slope dropping to the northwest. Excavations proceeded through the 28.0 cm (11.0 in) thick Ap horizon and 10.0 cm (3.9 in) into the E horizon. No artifacts were recovered and no features were present.

5.4 Artifact Descriptions

5.4.1 Lithic Artifacts

Lithic analysis identified 147 flaked stone artifacts from the Phase I survey of the Bridge 918 project area designated as Site 7S-C-97. These artifact types included six projectile points, three bifaces, one core, and 137 debitage.

5.4.1.1 Raw Materials

Ten raw material categories were identified during analysis of the Phase I assemblage. Jasper is by far the most common raw material, accounting for 107 artifacts or 72.8 percent of the assemblage. The closest primary source of jasper in Delaware is the Iron Hill locality. For this analysis, jasper was separated into two distinct types, a high quality vitreous stone and a lower quality "grainier" stone. This division is similar to that of Petraglia *et al.* (1998), in which a range of textural differences were noted during their experimental study of Iron Hill jasper. Based on the presence of large amounts of waterworn cortex in the Bridge 918 project area materials, most jasper was procured from secondary deposits. However, at least one specimen exhibits apparent "block" cortex, a rough, granular weathering rind, suggesting that a limited amount of jasper was procured from primary sources.

Like the jasper, most if not all of the remaining eight raw material types were procured from secondary sources. None exhibit block cortex; thus, they cannot be attributed to primary bedrock outcrops. Rather, most of these types likely reflect the cornucopia of knapable stone found in cobble deposits in the project area vicinity. After the two jasper types, dark gray chert was the second most common raw material in the assemblage, accounting for 13 artifacts (8.8 percent of the assemblage). Four dark gray chert artifacts exhibit cobble cortex.

Eight rhyolite artifacts, representing 5.4 percent of the assemblage, were identified during analysis. As discussed in the "Regional Lithic Materials" section of this report, rhyolite outcrops are located to the northwest of the project in southern Pennsylvania and northern Maryland. It is also possible to find rhyolite in secondary deposits, to the south of its primary source location. Because no cortex was identified on the rhyolite specimens, their source locations (primary or secondary deposits) cannot be determined.

Quartz, cream chert, and black chert each account for four specimens (each 2.7% of the assemblage). Two of the quartz artifacts exhibit cobble cortex, suggesting procurement from secondary deposits. While both the cream and black cherts lack any cortical materials, as discussed previously, it is most likely that both were derived from secondary stone deposits.

Banded gray chert and light gray chert each account for three specimens (each 2.0% of the assemblage). Neither exhibits cortex although it is most likely that both types were procured from secondary sources.

Analysis identified a single quartzite flake (0.7% of the assemblage). The piece exhibited cobble cortex, evidence of procurement from a secondary source.

5.4.1.2 Tool Types

Analysis identified six projectile points, three bifaces, and one core in the assemblage. These items are described individually below, while a discussion of the tools within the context of the assemblage follows a description of the debitage.

Projectile Points

FS 4.1 is a complete point manufactured from jasper. This piece exhibits a relatively short stem with weak side notches, while the blade is noticeably bi-convex in cross section. Slight reddening occurs on one face, suggesting possible heating of the piece. The biface measures 65.1 mm (2.6 in) in length, 22.2 mm (0.9 in) in width, and 14.7 mm (0.6 in) in thickness.

FS 23.1 is a tiny basal fragment of a stemmed point manufactured from a gray banded chert. The piece is truncated at the base by a flexion break.

FS 47.1 is a stemmed/weakly side-notched point manufactured from jasper. The piece exhibits reddening and a waxy luster suggestive of heating. In cross section, the blade appears bi-convex, perhaps due to progressive resharpening. The biface measures 35.4 mm (1.4 in) in length, 15.5 mm (0.6 in) in width, and 11.0 mm (0.4 in) in thickness.

FS 52.1 is a weakly side-notched point of jasper. The piece exhibits reddening in several areas suggestive of heating. The blade is bi-convex in cross section, suggesting that the piece has been resharpened. The biface measures 39.3 mm (1.6 in) in length, 25.2 mm (1.0 in) in width, and 12.6 mm (0.5 in) in thickness. The piece bears a slight resemblance to "Brewerton" points, a supposed Late Archaic diagnostic.

FS 81.1 is a small stemmed point manufactured from jasper. The distal end of the tool is truncated by a flexion break. The piece exhibits strong reddening, suggestive of thermal alteration of the stone. In cross section the piece is slightly bi-convex. The biface measures 17.9 mm (0.7 in) in width and 7.7 mm (0.3 in) in thickness. Conversations with Daniel Griffith suggest that this point may be similar to tools recovered from the Woodland period Wolfe Neck midden, also located in Sussex County (Daniel Griffith, personal communication 2005).

FS 96.1 is a small stemmed/side-notched point manufactured from jasper. A flexion break truncated the distal end. The point exhibits strong reddening, suggestive of thermal alteration of the stone. In cross section, the blade is plano-convex. The piece measures 21.5 mm (0.9 in) in width and 10.4 mm (0.4 in) in thickness. Discussions of the point's characteristics with Daniel Griffith suggest that the piece is similar to points identified with the Mockely component at the Carey Farm site, also located in Sussex County (Daniel Griffith, personal communication 2005).

Bifaces

FS 15.1 is a complete early stage (initially edged) biface manufactured on a jasper cobble. The piece is oval in plan view and measures 52.6 mm (2.1 in) long, 27.4 mm (1.1 in) wide, and 17.3 mm (0.7 in) thick. Approximately 75 percent of one face exhibits flaking, while about 50 percent of the opposite face is flaked. Smooth waterworn cortex remains on portions of both faces, as well as on portions of the lateral margins. The piece exhibits no evidence of thermal alteration.

FS 71.1 is a secondarily thinned biface. The piece is possibly manufactured from rhyolite, although the specimen appears slightly more vitreous than typical rhyolite. Regardless of stone type, the piece represents the basal/medial portion of a biface. A flaw in the raw material caused the fracture that removed the distal portion of the tool. The tool fragment measures 55.3 mm (2.2 in) in width and 15.1 mm (0.6 in) in thickness.

FS 99.1 is a primarily thinned jasper biface with cobble cortex on both faces. The piece represents the proximal end of the tool, and the piece retains evidence that a stem was being flaked on the tool when it was truncated. This suggests that the intent of the tool makers was to produce a projectile point from this biface. The piece exhibits reddening suggestive of thermal alteration.

Cores

Analysis identified a single core, FS 61.12 in the assemblage. The piece is classified as a bipolar core manufactured from jasper. The core is small, roughly rectangular, and measures 20.2 mm (0.8 in) by 12.5 mm (0.5 in) by 5.0 mm (0.2 in). The core is flaked on two faces, with all flake scars originating from the same platform on one end of the core. Bipolar cores typically produced flakes for expedient use, for insets in composite tools, and sometimes as sources of tool blanks. The piece exhibits no evidence of thermal alteration.

5.4.1.3 Flaked Stone Debitage

Analysis identified 137 waste flakes or debitage at the site. An examination of the diagnostic flake types as a whole suggests that flakes diagnostic of the early stages of lithic tool manufacture and/or core reduction (non-diagnostic shatter, cortex removal flakes, core trimming flakes) account for 47 flakes or 34.3 percent of the debitage. As discussed in the Lithic Analysis Methods section, non-diagnostic shatter (NDS) are most commonly associated with the earliest stages of lithic reduction, while core reduction flakes are from the knapping of cores. Flakes that exhibit cortex, but are otherwise non-diagnostic of reduction type, are classified as cortex removal flakes; while it is unknown whether these result from either core reduction or biface thinning, they nevertheless tend to be associated with earlier stage lithic reduction. Flakes from obvious biface thinning activities (initial edging, biface thinning flakes, and late stage/pressure flakes) account for 42 pieces of debitage or 30.7 percent of the total debitage. As discussed in the Lithic Analysis Methods section, initial edging flakes are distinctive flakes resulting from early stage biface thinning, biface thinning flakes result from mid-to-later stage thinning, while late stage/pressure flakes typically result from the final stages of tool manufacture or tool sharpening. Analysis also identified a single "edge bite" flake that results from a misapplication of force during biface thinning; the resultant flake removes a large portion of biface edge, thus distinguishing it from other biface flake types. The remainder of this section will discuss the debitage by raw material type.

Analysis identified 80 flakes of high quality jasper. These flakes suggest a range of flintworking activities at the site although flakes from the earlier stages of reduction (defined above) account for more (34 or 42.5%) of the jasper than flakes from biface thinning (29 or 36.3%). Flakes that cannot be assigned to specific types (fragments and indeterminate flakes) account for 17 or 21.3 percent of the high quality jasper.

Cortex was identified on 38 of the 80 jasper flakes (47.5%), a very high amount that suggests a relatively proximate lithic source. Of the flakes with cortex, 37 exhibit a smooth cobble cortex, suggesting procurement from secondary deposits, while one exhibits a rougher block cortex, suggestive of derivation from a primary source. The cortex data strongly suggests a reliance on jasper from cobble sources.

Fourteen of the 80 high quality jasper debitage exhibit heating, with seven exhibiting heat damage and seven exhibiting color/texture changes associated with heating. The heat damaged flakes include examples with potlidding, crazing, and other thermal fractures. This suggests either accidental heating or heat treating gone awry. The seven pieces that exhibit thermal alteration in the form of heat induced color (primarily reddening) or texture (these flakes exhibit an extremely waxy luster along with color changes) could be the result of intentional heat treating activities. Of these seven flakes, four are classified as biface thinning, one as core trimming, one as cortex removal, and one as indeterminate. A hypothesis regarding the possible intentional heat treatment of jasper will be presented in the Discussion section of this report that follows this description of the debitage.

The low quality jasper debitage comprises 19 pieces. Of these, six (31.6%) are classified into one of the early reduction categories (NDS, cortex removal, core reduction), while two (10.5%) were classified as biface thinning. The remainder were non-diagnostic fragments and indeterminate flakes. Cobble cortex was identified on six of the 19 pieces, while two exhibited thermal alteration. In all, the data suggests a relatively proximate raw material source, as well as the importance of earlier reduction stages for this stone type.

Dark gray chert, the third most common stone type, accounts for 13 (9.5%) of the 137 flaked stone debitage identified at the site. While an exceedingly small sample, the flake data suggest that reduction of this material was focused on the initial stages of manufacture, as well as the final stages of tool production. Cortex removal/core reduction flakes account for four (30.8%) of the 13 flakes, while late stage/pressure flakes account for two (15.4%) of the 13 flakes; flake fragments and indeterminate flakes comprise the remainder. The flake data suggest that the middle stage of lithic reduction (represented by standard biface thinning flakes) were not present in the dark gray chert assemblage. Regarding cortex, four (30.8%) of the flakes exhibit a smooth waterworn surface.

Rhyolite debitage comprises seven (5.1%) of the 137 flakes identified at the site. Of the seven flakes, two (28.6%) flakes, a standard biface thinning flake and an edge bite flake, represent the later stages of tool manufacture, while none were associated with the initial stages of reduction. The remaining five rhyolite debitage are represented by fragments and indeterminate flakes. No cortex was identified. Given the distance from either primary or secondary sources of rhyolite, the presence of primarily later stage debitage is not surprising; the early stages of manufacture, as well as the removal of cortical surfaces, likely occurred closer to the rhyolite source.

Quartz, cream chert, and black chert each comprise four flakes (each 2.9% of the flake assemblage). Two of the quartz flakes represent the early stages of reduction (one cortex removal and one core reduction flake), while a single biface thinning flake represents biface knapping. The final flake is classified as a fragment. Both of the earlier stage flakes exhibit cobble cortex, suggesting derivation from a secondary source, not surprising given the abundance of quartz in such deposits in Delaware.

Cream chert is represented by the mid-to-late stages of tool manufacture and/or tool resharpening (one biface thinning flake and one late stage/pressure flake).

The remaining flakes are classified as fragments. No cortex was identified on this stone type.

Black chert is represented by three late stage/pressure flakes and a single flake fragment. This suggests that a primary activity involving black chert was the sharpening of finished stone tools. No cortex was identified on this stone type.

Light gray chert comprises three pieces of debitage or 2.2 percent of the total flake assemblage. Of the three flakes, two were classified as biface thinning flakes, suggesting that the middle stages of biface manufacture were important at the site for this material; one flake was classified as a fragment. No cortex was identified on these three flakes.

Banded gray chert comprises two pieces of debitage, or 1.5 percent of the total waste flake assemblage. Neither suggested a specific reduction type: one was classified as a fragment and the other as an indeterminate flake. No cortex was identified.

Quartzite is represented by a single cortex removal flake (0.7% of the total debitage assemblage) that exhibits cobble cortex, suggesting derivation from a secondary deposit.

5.4.1.4 Discussion

The identified tools and debitage in the current site assemblage do not lend themselves easily to assignment to specific "occupations," or temporal periods. Although many archaeologists have traditionally assumed that certain point styles are "diagnostic" of specific time periods, recent research suggests that this assumption may be rather tenuous (see discussion in Rondeau 1996). Points are often reworked during their use-lives and certain styles may have persisted much longer than commonly assumed (East *et al.* 2002). Thus, the "typing" of points may be tenuous at best.

For instance, in the present analysis, five of the six points from the site are narrow stemmed to weakly side-notched also with a narrow stem. Do the relatively minor differences in point style in this assemblage actually reflect temporal differences or do they result merely from progressive reworking of the point and/or slight derivation by the point makers from some mental template? It is worth noting that small stemmed/weakly notched points are ubiquitous both in Delaware as well as in adjacent regions and may be associated with several time periods (East *et al.* 2002; Petraglia *et* *al.* 2002). In particular, Skelly and Loy has encountered many similar points associated with a variety of Archaic and Woodland components in the Susquehanna River drainage over the past several years, thus reinforcing our caution over assigning many points to specific types in lieu of absolute dates (East *et al.* 2002).

A single point, FS 52.1, is similar to the well-defined "Brewerton" type, a Late Archaic diagnostic. However, Skelly and Loy's work in several other contexts have found that such points may be associated with Woodland components as well (East *et al.* 2002). Thus, the use of this point as a "type," with all of the associated temporal implications, is not warranted in the absence of absolute dates.

As discussed above, the remaining five points are narrow stemmed to weakly side-notched (also with a narrow stem), and thus are relatively homogeneous. Four of these points are jasper, and one is a banded gray chert. Given this similarity in morphology and raw material, it is possible that these points represent a single temporal period at the site. Given the abundance of Woodland pottery at this locale, a Woodland date for the points would be most likely.

While the absence of features or apparent stratification of site deposits hinders an assignment of absolute ages to the points, there are, nevertheless, several interesting observations that may be made about the lithic assemblage that could further suggest that the points and much of the debitage originated from a limited number of occupations. Perhaps the most striking feature of this assemblage is the presence of thermally altered jasper artifacts. All four of the jasper narrow stem to weakly side-notched points, as well as a secondarily thinned jasper biface, exhibit a slight to deep red color suggestive of heating (FS 52.1, discussed previously, also exhibits slight reddening). Perhaps these tools were intentionally heat treated to improve their workability?

In order to evaluate the hypothesis that this reddening was a result of intentional heating, several lines of evidence were examined. First, if the heating of these stones was the result of intentional heat treatment, then they should not exhibit potlids, crazing, or other characteristics usually thought indicative of unintentional heating. After an examination of the points and biface, no evidence of these uncontrolled heat fractures were identified.

Second, in part based on personal knapping experiences of the lithic analyst, it is usually advantageous to heat treat an already partially reduced biface. If one attempts to heat a mass of stone (such as a core) that is rather large, it is difficult to control the exact amount of heating; if the stone stays in the fire too long it fractures, too little and no appreciable change in workability occurs. In addition, there is always a certain amount of "waste" material in knapping, and some stone contains hidden internal fracture planes that break unexpectedly when knapping. By only heat treating already partially reduced bifaces, the knapper avoids the problems of heating a large mass of stone while at the same time the knapper has already "tested" the new biface; most internal flaws will be identified before heat treatment, thus avoiding the wasted effort that results from heating poor quality stone. In examining the bifacial tool assemblage, the four jasper points, as well as the primarily thinned biface, exhibit heating. The discarded early stage (initially edged) biface does not. A plausible interpretation is that Native American knappers partially reduced a biface (e.g., the initially edged piece) before heat treatment occurred. This would allow the artisan to both test the stone to see if it was of appropriate quality and remove some of the waste material at the same time. If the biface was deemed appropriate for further reduction, then heating might occur; perhaps the primarily thinned specimen identified in the assemblage is an example of this scenario.

If bifaces were heated at a certain stage, then the resulting debitage should also exhibit evidence of systematic heating. If bifaces are being heated between the initial edging and primary thinning stages, then the resulting debitage should appear as biface thinning debris; the cortical surfaces remaining on the single primarily thinned biface in the assemblage suggests that some may also retain cortex. What does the evidence from the jasper flake assemblage suggest? Evidence of possible intentional heating is found on seven pieces of jasper debitage. Of these, four are classified as biface thinning flakes (generally thought to be from the mid-to-later reduction stages), one is classed as a cortex removal flake, one as a core trimming flake, and one as an indeterminate flake. The four biface thinning flakes fit the expected trajectory. The cortex removal flake and the indeterminate flake might fit the trajectory as well; however, as explained previously, neither are sufficiently distinct to classify them as either core reduction or biface thinning. Thus, the only exception to the expectation is the single heated core reduction flake. It is possible that this flake represents a misclassification, unintentional heating that did not inflict noticeable damage, or it may simply be one anomalous flake. Regardless, the debitage sample, though exceedingly small, does not refute the hypothesis.

The limited amount of debitage exhibiting heating does suggest one further observation. If heat-treatment occurred at the site, then it would be reasonable to suggest that heated jasper debitage would be more numerous; a limited amount of knapping frequently produced prodigious amounts of debitage. The low quantities of heated debitage at the site suggests that on-site heat treating is unlikely.

In all, the available evidence does suggest that the deliberate heating of jasper tools is a tenable hypothesis. If so, was this a technique that was utilized during a broad time period? Or, as suggested previously, do the relatively minor stylistic differences in these points suggest a limited number of occupations? Does the presence of this heat treating technique lend further support to the occurrence of only a limited number of occupations? In order to further test this hypothesis, additional data are required. It would be highly desirable to gain additional formed implements for both stylistic comparison and further examination of the heat treatment hypothesis. Second, a larger sample of bifaces might suggest the precise point at which heat treating was performed. Finally, additional debitage specimens could help strengthen or potentially refute the heat treating hypothesis. Additional hand excavation would result in a larger sample of artifacts for this purpose, while machine stripping could identify datable features that could help in assigning the points to a specific temporal period.

Several further observations seem warranted. First, although heated jasper does occur at the site, as noted above, it is unlikely that stone was heat treated there. Four of the five narrow stem to weakly side-notched points are either basal fragments or appear to have been extensively resharpened. Only a single tool appears to have any utility left as a cutting or penetrating weapon. This suggests that retooling occurred at the site, where worn or broken points were removed from the haft and new points were added. It is common to find numerous points and fragments at such "retooling stations" (Hofman 1992). In this scenario, heat treatment occurred at another site, with partially reduced bifaces transported from site to site in anticipation of future use (Kelly 1988). As heat treating takes some time to complete, it is likely that heat treatment occurred on an occasional basis only. Perhaps the unheated jasper point debitage represents material that was procured in-between heat treating episodes and that some tools were simply reduced without heating.

Second, the lack of informal unifacial tools at the site is somewhat surprising. While the assignment of such classes as "utilized flakes" are normally done with caution, the complete absence of any unifacial tool is unusual. Unifacial tools are generally thought of as common tools used for a variety of domestic purposes. The presence of pottery, as well as cobble stone tools, at the site suggests that some occupations could have lasted for a longer period than a simple overnight stay, as many similar plowzone assemblages are interpreted. If so, then unifacial tools should be more common. In fact, if occupations lasted for even several days, it would not be surprising to find many more stone tools and especially flaked stone debitage. How might this be accounted for?

Andrefsky (1994) suggests that the amount of formal (i.e., biface) and informal (i.e., utilized flake) tool production is related to raw material abundance and quality. According to Andrefsky (1994), locales where high quality stone are found in low abundance should condition the knappers to the production of primarily formal tools such as bifaces. This suggests an economizing measure used to preserve raw material stocks. In the case of Site 7S-C-97, the presence of (primarily) bifacial tools of high quality jasper would suggest this situation. In addition, the only core recovered at the site is a bipolar core of jasper. The presence of bipolar cores in an assemblage may further suggest that knappers were attempting to conserve high quality stone. While jasper does occur in secondary deposits in the region, perhaps the most desirable (i.e., high quality; see Petraglia *et al.* 1998) jasper occurs in low abundance or is difficult to find, hidden under a smooth cobble cortex, and hence the need for economizing measures.

Third, the near absence of chert with a rough "block" cortex suggests the strong reliance on secondary sources. As discussed above, however, the data suggest that high quality stone, particularly jasper, might have been difficult to find near the site. Thus, toolmakers may have taken great care in selecting stone to knap. While the reliance on jasper does suggest that it was a preferred raw material of site inhabitants, as discussed previously, a variety of other stone types occurred at the site. The low frequencies of these other stone types as both tools and debitage suggest that they were also procured from secondary deposits, perhaps when the tool makers were searching for jasper.

5.4.2 Ceramic Artifacts

The pottery includes 76 sherds from several different vessels. The majority of the sherds appear to have had a fine shell temper (now leached), with cord-marked, netimpressed, or fabric-impressed surface decorations. In conjunction with published type descriptions, and after consultation with Dr. Daniel Griffith, these sherds correlate most closely with the Mockley series. Thirty-three sherds were identified as Mockley-like.

Other pottery includes: two steatite-tempered sherds (possibly Marcey Creek/ Selden Island); one grog-tempered, cord-marked sherd (possibly Coulbourn-like); one grog-tempered, fabric-impressed sherd (possibly Coulbourn-like); three indeterminate surface decoration, very coarse crushed rock-tempered sherds (Wolfe Neck-like); and one indeterminate surface decoration sherd tempered with granule-sized, crushed rock (possibly Wolfe Neck-like). The remaining 35 sherds were too small or eroded to be assigned to a possible type affiliation.

It should be noted that sherds (and projectile points) were typed only to provide a preliminary assessment of the number of possible components at the site, and to provide a generalized time frame for the site components. It is recognized that there are a number of factors that undermine simple typologies and chronologies (e.g., heirloom curation, individual idiosyncrasies, source to source variation in clays), such that it is not always safe to expect a one-to-one relationship between type and date. As research progresses at this site, it will be possible to move beyond typological/chronological description to address broader behavioral issues.

5.4.3 Other Lithic Artifacts

The Site 7S-C-97 assemblage includes two other lithic artifacts classified as stone tools. Both tools are derived from local bedrock or detritus from local sources. FS 80.1 is a fragmentary, modified rock (shaped) made of fine grain, dirty sandstone and weighing 75.6 gm (2.7 oz). Modified rocks are interpreted as being specifically shaped prior to use. The tool has partial, unifacial to bifacial flaking with smoothed/polished working edge(s).

FS 100.1 is a fragmentary, utilized rock (not shaped) made of medium grain, orthoquartzite weighing 843.9 gm (29.8 oz). Utilized rocks are interpreted as having arrived in their present condition as a result of use. These types of tools do not seem to have been previously modified for a particular task. This tool has two opposing, concave surfaces and may indicate that it is a mano. One of these concave surfaces shows a well-developed shoulder, which may be the result of grinding. A catalog of other lithic artifacts is presented in Appendix C.

Totals of 354.9 gm (12.5 oz) of thermally altered rock and 395.4 gm (14.0 oz) of miscellaneous rock fragments were recovered from Site 7S-C-97. The following definitions of these two categories, used in this report, are as follows:

Thermally Altered Rock includes any rock showing signs of thermal alteration, whether by coloration or fracture. Though the method of alteration may not be known, these rocks were categorized as thermally altered. At times, a judgment was made as to whether material was thermally altered based on context.

Miscellaneous Rock Fragments are fragments of rock not exhibiting thermal patterns (color or fracture) or any obvious cultural modification. It was presumed that they were naturally fractured. This material was most likely manuported to the site, since there are no rock outcrops at this location and the material was found suspended in sandy loam soils. Although it is suspected that some of this material was used in hearths or other thermal features, these rocks show no convincing signs of thermal alteration. It may have been thermally altered rock that cannot be easily distinguished as such, or material resulting from other unknown processes. Specific rock types were not distinguished.